MNA 2013 WORKSHOP:
EXPRESSION OF AXON GUIDANCE GENES IN THE PROSOMERE 1
Karen Stanic Aguillera, Axon Guidance Laboratory, Dpto. Cell Biology, Faculty of Biological Sciences, University of Concepción, CHILE

INTRODUCTION

The path that a navigating axon takes in the proximities of the midline it is determined by the way its growth cone integrates a variety of signals present in the extracellular matrix and in the membrane of neighboring cells. The interaction with these molecules produces attraction, repulsion or a change in directionality by modifications in the growth cone cytoskeleton.

The family of gene x and its ligands are translated into transmembrane proteins which mediate bidirectional signaling within adjacent cells, activating signal transduction pathways in both ways, the cells that present the ligands and the ones that express the x protein. These signals modulate the dynamic of the cytoskeleton, affecting the cell morphology, motility and adhesion. It has been described that this family participates in multiple morphogenetic processes, including gastrulation, segmentation, axon guidance, fasciculation and cell migration along the neural tube.

Previous studies shown the presence of gene x in the dorsal zone of the diencephalon during early chick developmental stages, however it has not been described the precise localization nor the relation of its expression with the formation of the posterior commissure (PC), the most important hallmark of the prosomere 1 (P1). Studies in our laboratory have elucidated the expression of this gene in the diencephalic roof plate (DRP) among different stages of development, and a correlation between the presence of SCO-spondin (axon guidance molecule), x gene expression and the formation of the PC has been achieved. Therefore during this project we aimed to study the expression of gene x among mammalian development using as tool Allen Brain mouse developmental atlas to assess if this pattern its evolutionary conserved.

EXPRESSION OF AXON GUIDANCE MOLECULES IN THE P1 DURING MOUSE DEVELOPMENT (E11.3)

(A) Slit2
(B) Slit1
(C) Robo1

CONNECTIVITY ANALYSIS IN ADULT MOUSE BRAIN (56 DAYS). POSSIBLENUCLEI THAT FORM THE PC

- Gene X its conserved from avians to mammals with the same expression pattern, suggesting a similar mechanism throughout development in P1 region.
- Robo-Slit pathway expressed in E11.5 mouse embryos seems to be also present in P1 during avian development
- PC have fiber components from the RN and MRN not described yet in literature, which could explain the diversity of axon guidance molecules and the different effect of them on the axons that form this structure.

REFERENCES


RESULTS

ISH SAGITTAL SECTIONS OF GENE X EXPRESSION IN E11.5 MOUSE EMBRYOS

Figure 3: Allen Mouse Brain developmental atlas sections for gene x visualized by ISH. Sections from left to right, top to bottom, advancing towards the midline zone. Expression of Gene X is seen in the pial membrane, lateral alar plate, medial alar plate and dorsal roof plate (arrows).

CONCLUSIONS

- Gene X is conserved from avians to mammals with the same expression pattern, suggesting a similar mechanism throughout development in P1 region.
- Robo-Slit pathway expressed in E11.5 mouse embryos seems to be also present in P1 during avian development
- PC have fiber components from the RN and MRN not described yet in literature, which could explain the diversity of axon guidance molecules and the different effect of them on the axons that form this structure.

REFERENCES